Sources of Agricultural Statistics - Part 1: Discussion

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1. Introduction

There are seven papers in all, including five invited papers and two contributed papers, for this session. In terms of geographical coverage, these contributions represent four continents and several countries, and cover over one third of agriculture in the world. These are valuable documents based on rich experience of the authors and I have enjoyed reading them. Five papers deal with agricultural censuses and two with related aspects of "Integration of Administrative Data with Census and Survey Data" and "Sampling Strategies for Agricultural Censuses and Surveys in Developing Countries". Agricultural censuses are conducted in different countries of the world in a variety of ways. Some countries conduct a complete census of agriculture, while others undertake only a sample enumeration. The differences in agricultural census programmes also exist in terms of interval between successive censuses, content and methodology of data collection and analysis, dissemination of census results, etc. For example, Australia has been conducting an annual postal census. Most countries in Africa and many countries in Asia conduct a decennial sample census based on farmers' interviews. Comments on individual papers are as follows.

2. "Experience with Annual Censuses of Agriculture" by Glen Sward, Geoff Heffernan and Alan Mackay, Australian Bureau of Statistics

The paper gives in retrospect the long and successful experience of ABS in conducting postal agricultural censuses. Some highlights of the annual census programme are: its flexibility, strategies to improve response rates, quality of statistical outputs, computer-based data entry system, dissemination of national and regional estimates on diskettes and CD-ROM apart from printed reports. Customized data services for a fee are also available. In the future, data capture via Internet is being considered. One of the most important outputs of the censuses is Statistical Local Areas data. Trials are underway to provide data according to users' specific needs. However, only a passing reference has been made about the post enumeration survey conducted after the census. How was it conducted and how it helped to improve the census programme is not given. Release of first estimates on the basis of 40 percent data within 2 months of completion of census is remarkable in terms of timeliness, but unless this 40 percent is a representative sample from the whole population, the results may have limited utility. Non-sampling errors common to postal censuses are expected to be present in the census results.

The paper does not give any details about the programme of annual commodity sample surveys for 1997-98 and the proposed 5-yearly agricultural census to be undertaken in 2001-02 to replace the annual census. These details would have been of much interest. The new programme of sample surveys and censuses will undoubtedly benefit from the experience and expertise developed by the ABS in conducting censuses over a long time. Hopefully, the new programme will also overcome some of the problems encountered during the earlier annual censuses and help in reducing non-sampling errors in the data, apart from reducing the cost. In particular, it may be worthwhile to examine the feasibility of using objective methods of data collection in the survey. Using some of the recently developed

techniques for small area estimation, the survey data may be able to satisfy the demand for small area statistics as well.

3. "Experiences with Census of Agriculture in Africa" by Ben Kiregyera, FAO Consultant, Ministry of Agriculture, Tanzania

This paper gives the experience of conducting agriculture censuses in African countries based on the author's experience in Tanzania, Zambia and possibly other African countries. Agricultural census in African countries is a sample census in which data are collected by trained enumerators by interviewing the selected farmers, and household rather than agricultural holding is the unit of enumeration. Organizational and operational problems such as timing of the census, its high cost and complexity, lack of technical skills and experience, and technical problems such as construction of sampling frames, sample selection, problems of measurement of area and yield specific to African countries, apart from the steps normally involved in conducting a census, have been well covered in the paper.

The subsistence, or traditional, sector is quite large in African countries, but I have seen that the large-scale commercial sector is also quite significant in countries like Malawi and Zimbabwe.

Agricultural census in African countries is an expensive and complex statistical operation undertaken with donor support. The main reasons for its high cost and complexity are: traditional nature of agricultural sector, poor infrastructure and lack of technical skills and experience, as pointed out in the paper. However, the methodology used for agricultural census also lacks simplicity and needs to be reviewed. The scope of data collected in agricultural census in African countries also needs to be scaled down.

Enumeration areas (EAs) are the primary sampling units (PSUs). Since these are more or less equal in size, there is not much point in selecting the EAs with probability proportional to size (PPS) with number of households as the size measure and with replacement. The author observes in section 3.14.2 of the paper that some important agricultural variables are not related to population numbers. Moreover, the population numbers used are also mostly out-of-date. As also pointed out by David in his paper, it is necessary that sampling designs used in agricultural censuses need to be simple and easily managed by national statisticians themselves. Then why use PPS sampling?

The use of objective methods of measurement of area and yield in census, mentioned in the paper, makes it very complicated and expensive. Simpler methods, like pacing method of measurement of area and farmers' estimates of production soon after harvest, could be used conveniently instead of these methods.

Low participation by African countries in an agricultural census programme is a matter of serious concern. Only 14 out of 55 countries participated in the World Census of Agriculture (WCA) programme in 1990. There is an urgent need to look into the problems of these countries so as to improve their participation in the WCA 2000 programme.

The suggestion to establish a census programme to combine collection of both agriculture and population data to improve the future outlook for the census programme is good, and this is also being encouraged by FAO. However, expanding the scope of annual surveys in Africa to include data on indicators normally monitored by agricultural census needs further discussion, firstly, because census indicators need not be monitored every year, and secondly, because this may adversely affect the

quality of data of annual surveys. This type of arrangement may, however, be considered once in five years if an agricultural census is not being undertaken.

4. "Sampling Strategy for Agricultural Censuses and Surveys in Developing Countries" by Isidoro P. David, Asian Development Bank

Several reasons are often given in favour of using complete enumeration in a census in spite of its known disadvantages. Sample censuses of agriculture were successfully undertaken in Indonesia and Nepal in 1992 and in the Philippines in 1991. Further, the samples for intercensal agricultural surveys in these countries were selected from the main census samples. Linking the census of agriculture with intercensal surveys in this way has several advantages such as likely reduction of discrepancies from the two sources. The census can also be used as a source of concomitant variables for ratio/regression estimates or as the sampling frame. Using the data from the Philippines, some doubt has been expressed about the trustworthiness of a complete census as a source of small area statistics, which is the main reason given in its favour.

In fact, there appears to be no point in doing a complete enumeration for agricultural census unless there are very compelling reasons to do so as in the case of censuses of population and housing. On account of resource constraints, many countries will have no choice except doing a sample agricultural census. But should that be the only reason in favour of doing sample enumeration?

The reason given by FAO that the use of sampling in agriculture will need sampling experts who are not available in agricultural statistics agencies needs further discussion. Firstly, there is no need to use complicated sampling designs in agricultural censuses and surveys. A simple stratified two-stage sample design is suitable for both censuses and surveys in agriculture in most situations. Use of PPS sampling (with or without replacement) in agricultural surveys/censuses seldom results in significant gains in statistical efficiency and needs to be avoided. Generally, data on a number of variables are collected, and if there is some gain in efficiency for some variables, there is loss for others.

Secondly, should it be necessary to always compute sampling errors of the estimates? Perhaps not, if it is known that the sampling error is not likely to be unreasonably high. Sampling errors do not change much unless there is a significant change in the structure of the population or the sampling strategy adopted for the census survey. If capabilities are not available, computation of sampling errors may be limited to pilot studies and estimated only occasionally. More attention needs to be paid to the control of non-sampling errors, which is comparatively easy in a sample census survey.

5. "Agricultural Census and Improvement of Rural Statistics in China" by Zhu Xiangdong, FASC, SSB, PRC

The paper gives various aspects such as background, planning and organization, and operational and technical details of the 1997 agricultural census in a systematic manner. It also covers the method of data analysis and the details of post-enumeration quality checks undertaken within two months of completing the census. The results of the post-enumeration check revealed that the quality of census data was reasonably good and acceptable to government departments at various levels. The concerned Chinese authorities deserve to be congratulated for successfully accomplishing such a gigantic statistical operation in a timely manner.

It is natural to compare the census results with those coming from the traditional annual report and see the differences. The differences are more in cultivated land, agricultural enterprises and machinery,

livestock (cattle, sheep and pigs) in hand and sold, etc. However, both data sources have some weaknesses. The annual report is subjective, and the census data are subject to non-sampling errors. It may not be easy to reconcile them. In fact, there is another source of data, i.e. the data from the post-enumeration survey, that appears to be qualitatively better than the data from the above two sources. The data from the post-enumeration survey could also be used to reconcile the differences. But it seems that this survey was planned only for evaluating the quality of census data and not for estimating the various indicators. It would have required a sample of about one percent of holdings to provide provincial level estimates from this survey; the sample size for the post-enumeration survey was much less. In retrospect, a sample enumeration could have been planned in place of a complete census.

The value of using sampling in agricultural censuses and surveys has been well recognized in the paper. The census frame will be used to conduct future agricultural sample surveys, which will help to improve rural and agricultural statistics of China. Moreover, it has been decided to repeat agricultural censuses as sample censuses every 10 years.

The paper also recognizes the importance of integrating data from all sources in an optimum way. The paper concludes that the successful agricultural census has increased the demand for rural statisticians and this should help China to improve data sources according to their needs. It may be concluded that the future outlook for agricultural statistics in China appears to be bright.

6. "Integration of Administrative Data with Survey and Census Data" by Michael Trant and Patricia Whitridge, Statistics Canada

The paper highlights the importance of integrating administrative data with census and survey data for building an agricultural statistics system. In the context of resource constraints and budget cuts for statistical programmes, the subject of the paper is extremely important. For building an agricultural statistics information system, all available data need to be listed, arranged and linked in an optimum way. Large amounts of data such as import, export and trade-data, which already exist in administrative records and which are quite difficult to collect otherwise, must be used.

But as rightly pointed out, using such data is a challenge for the statisticians. It needs legislation, cooperation between various agencies, experienced statisticians, funds and above all hard work. The extent to which integration of data is achieved depends on the degree of maturity of the statistical system, the quality and amount of information available, trained and experienced staff, funding, and cooperation among concerned agencies. Canada has been able to achieve integration of data as a result of sustained efforts extending over a period of 70 years. Many countries could benefit from their experience in this area. But most of the developing countries suffer lack of most of the facilities listed above. Moreover, there is not much exportable surplus or large-scale commercial agriculture in many countries which create more demand for data.

In the context of developing countries in Africa and Asia, it may not be true that most countries have gone through an evolutionary process in establishing their agricultural statistics information system. Among developing countries, there is also considerable variation with regard to the state of agricultural statistics, particularly in countries like Mozambique and Angola, where very little data on agriculture are available. A very relevant point made is that the statistical agencies exist in order to provide users with accurate, relevant and reliable statistical information, but their long-term survival depends on their ability to evolve and adapt. Unless the statistical agencies realize their responsibility and fulfill their role in providing data, the users may lose faith in them. According to present indications, developing

countries will take a long time to integrate all the available data in their agricultural statistics system. They need not only encouragement, but also financial and technical support for this purpose.

7. Contributed Papers

The paper *"The Argentine National Census of Agriculture of 1998" by Lic. Delia Keller* gives salient features such as generation of environmental, sustainability and resource management indicators, gender issues in agricultural production, and the extent of use of specialized agricultural services. But again, it is not clear why they are planning a complete enumeration and not a sample census. Moreover, the ways and means to control non-sampling errors have not been covered in the paper.

The paper *"Experiences with Census of Agriculture in Korea" by Dong-Keun Kim* highlights the importance of agricultural census data in Korea because census was conducted after five years in 1995 in place of a decennial census. Salient features of the census are well summarized in this paper, except the steps taken to ensure that the data collected were of sufficiently high quality. Korea may also consider the possibility of undertaking sample censuses in place of complete censuses.

8. Conclusion

Agricultural census is an important component of an integrated agricultural statistics programme and is the main source of benchmark data for studying changes in agricultural situation. The other sources of data on agriculture are sample surveys, administrative records and research studies. Demand for accurate and reliable data on various aspects of agriculture is increasing. In order to strengthen agricultural statistics systems, it is necessary that various sources of data are improved and integrated to meet the data needs of users. Many important issues have been raised by the authors and useful suggestions have been made to address these issues. The main issues are:

- Agricultural census as an important source of data,
- Issues relating to separating agricultural census data items from agricultural sample survey items,
- Implications of change from annual census to annual survey and 5-yearly census in Australia,
- Low participation by African countries in agricultural censuses and suggestions like establishing a census programme to combine both agricultural and population data,
- Data quality and need to control sampling errors,
- Simplifying the methodology of agricultural census sampling designs, methods of data collection, etc.,
- Use of sample enumeration in place of complete enumeration in agricultural censuses,
- Advantages of linking intercensal surveys with agricultural censuses through two-phase sampling,
- Using simple sampling designs in sample censuses/surveys,
- Need to integrate administrative data with data from agricultural censuses and surveys, and
- Problems/difficulties faced by developing countries in the process of integrating data from various sources, and the need for technical and financial support.